Module 2
Math & Study Skills

Learning Objectives

By the end of this section, you will:

1. Demonstrate simple math calculations using a calculator.
2. Demonstrate several active learning techniques during this course.
3. Use several techniques to improve your memory.
4. Choose test-taking strategies that will help you when you take the crane certification test.

Math Skills

What math skills do crane operators need?

» Add.
» Subtract.
» Multiple.
» Divide.
» Work with fractions and decimals.
» Find volume for many different types of objects.

Crane operators must be able to perform essential math operations to verify load weight and determine crane capacity on load charts. These calculations don't need to be done in your head. Whenever possible, a calculator should be used to avoid errors.

An error can have serious consequences.

Numbers representing parts of a whole number are called fractions. Simple fractions are familiar: a dime is 1/10 of a dollar.

In general, fractions look like this:

$$\frac{1 \text{ (numerator)}}{10 \text{ (denominator)}}$$

Decimals also represent parts of a whole number where the value (number) is to the right side of a decimal, such as 1/10 = 0.1

Using decimals instead of fractions makes it easier to perform mathematical tasks (adding, subtracting, dividing and multiplying).

To convert a fraction to a decimal divide the numerator (top number) by the denominator (bottom number).

Example: To convert 1/2 to a decimal: 1 ÷ 2 = 0.5 so 0.5 = 1/2

Crane operators must be able to convert inches to feet. This is done by dividing by 12.

Why?

» There are 12 inches in a foot.

For example: 39 inches = 39/12 ft. = 3.25 ft. To convert 5/8 in. to parts of a foot in decimal form divide 5/8 by 12. First change the fraction to a decimal, 0.625, then divide by 12. The result is 0.052 ft.

Using a simple calculator, practice performing simple math calculations by completing the work sheets in Appendix B.

Study Skills

With a partner write down all the things you will do to study for the crane certification exam.

It's important to use *active* learning strategies. These include:

1. Knowing what will be on the test,
2. Scheduling regular study times,
3. Building on what you already know, and
4. Using all your senses while you study.
5. Practice and review material.

The most important aspect of learning is to practice and recall the information you are learning. The more time spent reviewing and thinking about the material the more you will learn.

The first step when preparing for a test is to find out what will be on it.

Find out what facts you will need to know, calculations you will need to perform and skills you will need to demonstrate. Remember you will need to retake the certification test every five years, so focus on understanding the material, not just memorizing it.

The next step is to have a plan.

1. Schedule regular study times.
2. Review regularly.
3. Have a designated study area.
4. Eliminate distractions.

Your schedule should allow you to consistently review these materials between now and the test with plenty of "away" time, too. You will remember more if you distribute your study time over several weeks rather than cramming right before the test. You will also benefit from creating a designated study area that is quiet, comfortable and contains all your materials.

Before you start, activate your prior knowledge.

You already have a wealth of knowledge about crane operations which makes it much easier to learn and remember new facts and procedures. New information is easier to store in your brain if you can attach it to some piece of information already there. Thinking about what you already know will also build your confidence and make learning easier.

When you study use more than one sense.

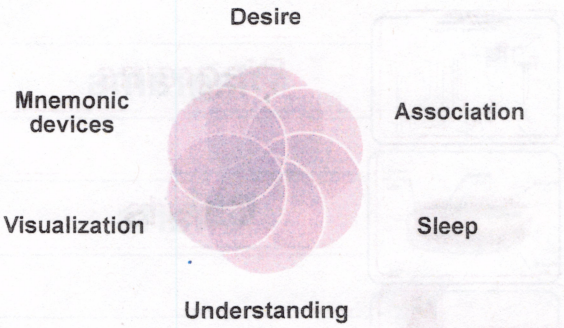
Read the material, say it, write it down, walk around as you study, tell it to someone else, rewrite the material in your own words, move as if you were actually performing the task. Doing some or all of these things will increase your understanding of the material and engage your brain in the learning process. This helps move information from short-term to long-term memory. Simply reading or highlighting information is too passive and does not result in a better understanding of the material or improved retention. Get actively involved in your learning.

Finally, practice and review the material you are studying often.

1. Summarize the material.
2. Make note cards.
3. Quiz yourself.
4. Form a study group.
5. Rehearse with sample tests.

The more actively engaged you are with the material the more you will learn. Taking sample tests will allow you to rehearse for the actual test. It will build your confidence and show you areas you might still be weak in.

There are many ways to improve your memory skills.



Wanting to remember something is the first step.

You must intend to remember. From the start you need to engage with the new information so it will become part of your long-term memory. Don't just hope you'll remember. You quickly start to forget if you don't actively try to remember a new fact.

Make sure you understand the material before you start to commit it to memory.

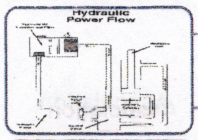
Trying to remember material you don't fully understand can be very frustrating. Once you memorize information it is very hard to dislodge it. It is also a terrible waste of time to learn and then unlearn wrong information.

The next step is to make associations.

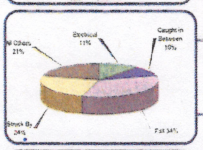
1. Organize new information into categories.
2. Associate new information with your prior knowledge.

It is easier to remember things if you can organize them into groups. Putting new information into groups of things you already know will help put it into your long-term memory.

Visualizing information can be a very powerful memory tool.



Diagrams

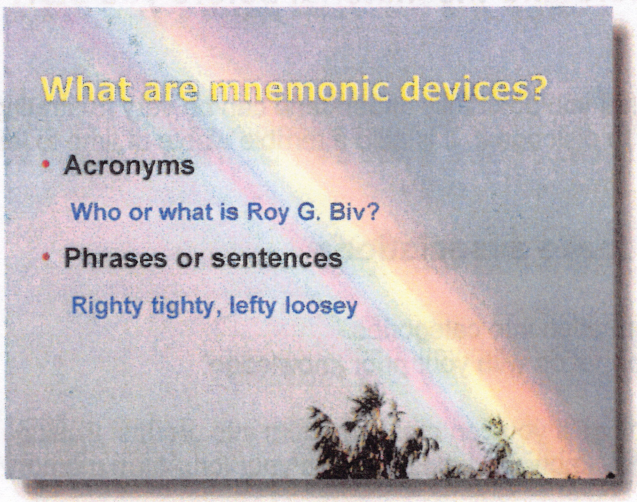


Charts

Pictures

We are visual animals and research shows that our memories have a large visual element to them. Try to use diagrams or pictures to remember material. Make your own drawings.

Mnemonic devices.

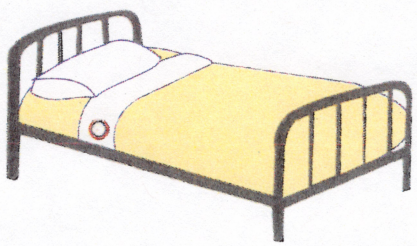


Mnemonic devices can help in remembering lists of facts. Acronyms like Roy G Biv to help you remember the order of the colors in light. Sentences like "Righty tighty, lefty loosey" help remind us of which way to turn a screw.

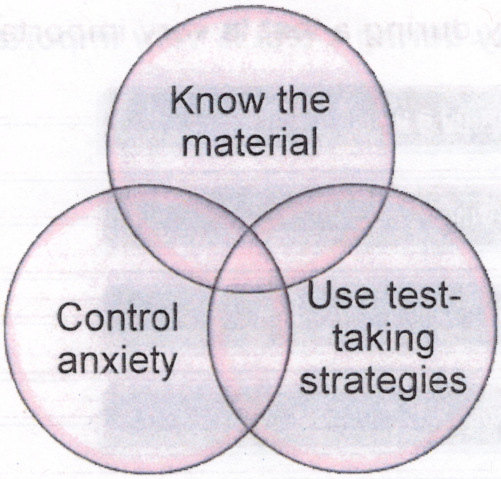
Sleep plays a very important role in forming memories.

Research shows that reviewing material right before you go to sleep will be quickly and efficiently stored in your long-term memory. It is believed that the delta waves of deep sleep help consolidate and process all the associations and connections made when you are learning new information.

- **Necessary for good memory**
- **Delta waves improve retention**

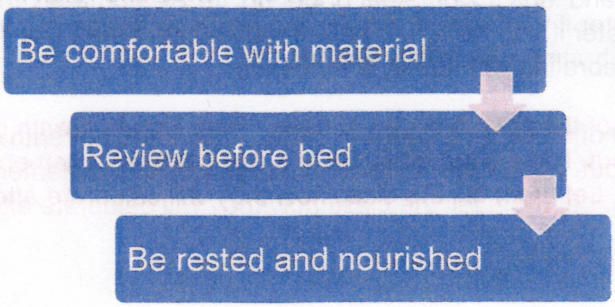


There are many ways to improve your test-taking skills. These include knowing the material well, controlling your anxiety during the test and employing several test-taking strategies. Using these techniques will allow you to demonstrate on the test how well you know the material.



Before the test make sure you are prepared.

All the studying and practicing you've done should have you feeling comfortable and confident about your knowledge of the material. Review the material immediately before you go to bed so your brain can process it while you sleep. Go right to bed. Watching TV or even reading will lessen the benefit of this. Make sure you are well rested and have eaten something before you take the test. Watch how much liquid you drink because if you leave the testing room you cannot return.



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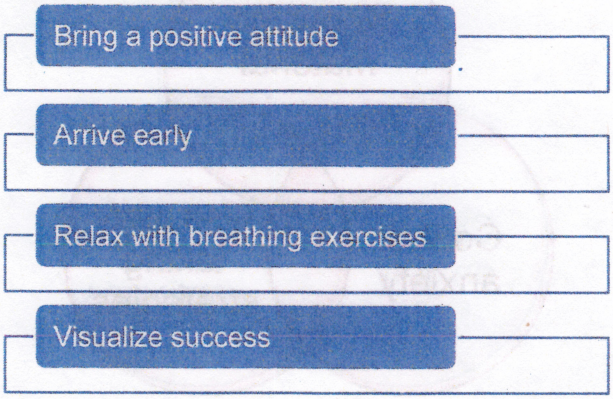
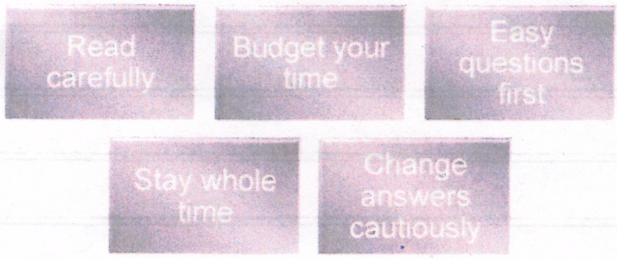
Controlling your anxiety during a test is very important.



Approach tests with a positive attitude. Replace negative thoughts with statements like "I have studied hard and know this material. I am going to do well on this test." Keep the test in perspective, this is not a test of your self-worth, just what you know about cranes today. Arrive early for the test so you can do a quick final review if you wish and relax before the test starts. Deep breathing exercises will help you relax and feel more in control. This can be done by sitting up straight in your chair and slowly breathing in through your nose using your diaphragm. Fill your lungs completely and hold for a few seconds, then exhale slowly through your mouth. Do this several times to calm yourself before the test. Focus on your breathing not on the test. During the test if you start to feel overwhelmed, turn the test over and breathe deeply. Stretch your arms and legs in your seat or get up. Tense and relax muscles. Use positive "self-talk" and take a drink of water if you have it. Finally imagine how happy you will be when you pass the test. Visualize yourself celebrating with family and friends.

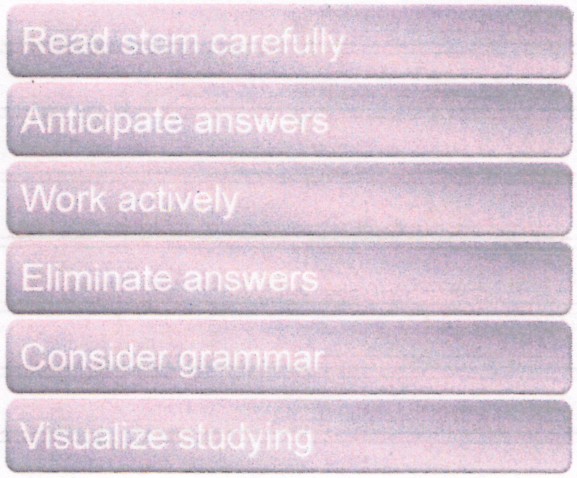
[Have students practice all of these techniques in class. They should breath deeply but slowly. Too fast and someone might pass out. Have them write down a few positive statements about themselves in regard to crane operations. Let them tell the class how they will celebrate after they pass this test.]

Use test-taking strategies to maximize your score.



As soon as you sit down, write crucial data and formulas on a scratch sheet. Jot down any facts or figures that pop into your head. When you get the test carefully read all the instructions. If you have a question about them ask right away. Budget your time so you have plenty of time for all the questions. This is a timed test but don't race through it. Answer the easy questions first. This will help build your confidence and give your body time to calm down. If you get stuck on a question skip it, but remember to come back to it later. You might want to mark on your scratch paper which questions you've skipped. There may be information in later questions that will help you answer these. Stay for the entire time even if you're done. You will be more relaxed by then and some piece of important information may come back to you. Go over the exam to make sure you have answered all the questions. However, only change an answer if you are sure your first answer is wrong. If you are not finished but you're almost out of time, answer the rest of the questions by guessing.

Here are some specific tips for taking multiple choice tests.



Read the stem of the question very carefully and try to anticipate the answer before you read the choices. Choose the answer that is most correct. Do not jump to the first correct answer you see. Read them all. It is possible to misread questions the first time. Rereading is always a good idea. More difficult questions may require you to underline or circle key words or phrases to help you understand what is being asked. Eliminate answers you know are wrong such as funny answers. Usually "None of the above" is wrong, but "All of the above" is a good choice especially if you know two of the choices are correct. Usually very long answers are the correct choice and if two choices are the exact opposite of each other one of them is usually correct. Check for grammatical inconsistencies such as verb tense disagreement or the article an is used and only one choice starts with a vowel. If you are stumped by a question, try visualizing where you studied or learned about this material. That may help you to "see" the answer on the page or in the notes you took.

Notes: